GRADE 5

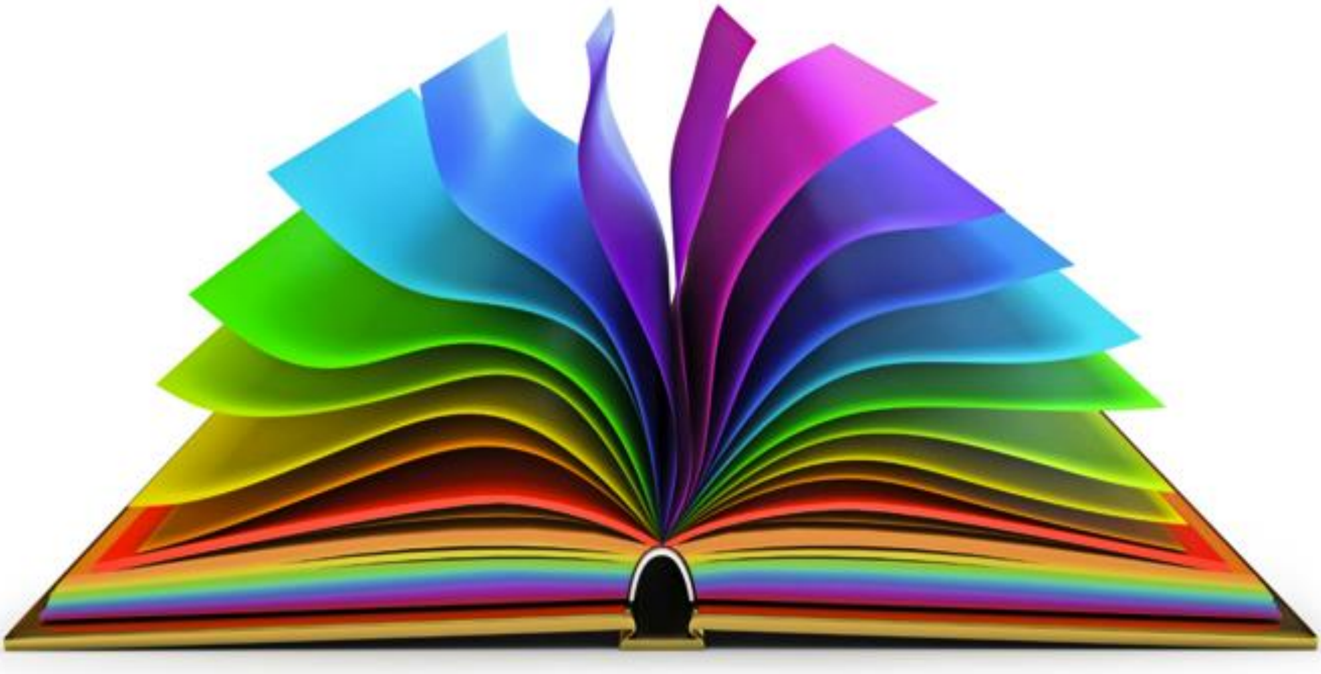
TERM 3

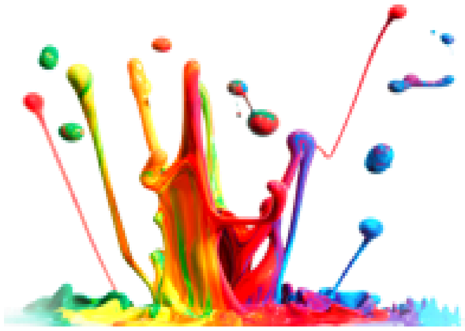
NATURAL SCIENCE AND TECHNOLOGY

STUDY NOTES

THINK

DIGITAL ACADEMY





FUELS

Fuels are materials that **store energy.**
This stored energy can be released to do useful work like providing heat, light or powering machines.

What are some common fuels that we use every day?

- **Coal:** A brownish-black rock that is burned to produce heat.
- **Wood:** Trees and other plants that can be burned to release energy.
- **Petrol:** A liquid fuel mainly in cars.
- **Paraffin:** A type of oil used in lamps and heaters.
- **Gas:** Used in stoves and heaters.
- **Candle wax:** Used to make candles that produce light when burned.

How Do Fuels Work?

When we burn fuels, they release energy in the form of heat and light.
Example: When you light coal, the coal burns and gives off light and heat.

This process is called **combustion.**

Exploring Different Fuels – Input and Output

FUEL	INPUT	OUTPUT
Wood	- Needs to be dry - Requires kindling (small pieces of wood or paper) to start burning	- Releases heat and light when burned. - Can also produce smoke.
Coal	- Significant amount of heat to start burning - Sometimes special fuel or kindling used to ignite.	- Burns for long and releases large amount of heat. - Good for heating homes and powering steam engines
Candle wax	- A small flame (from a match/lighter) needed to start melting and burning the wax	- Burns and provides light and small amount of heat.

DID YOU KNOW?

Each fuel has different properties.

1. **Wood:** Requires moderate effort to start burning and produces a good amount of heat and light.
2. **Coal:** Takes more time and effort to ignite and produces more heat over a longer period but less light that wood.
3. **Candle wax:** Easy to ignite and produces a stead light and only a small amount of heat.

How Do We Use Fuels Everyday

COOKING

Gas and paraffin stoves are common.

HEATING:

Wood and coal are used in fireplaces and stoves.

LIGHTING

Candles when there is no electricity

TRANSPORTATION

Petrol and diesel power cars, buses and trucks.

Energy In Food

Food provides energy to our bodies that we use to move, grow and stay warm.

WHAT WOULD HAPPEN IF WE BURNT FOOD FUELS?

➔ **Peanut:**
Input: Use a match to ignite – this might take some effort to start.
Output: Peanut will burn and produce a surprising amount of heat and a little light – they are high in fat which is a good energy source.

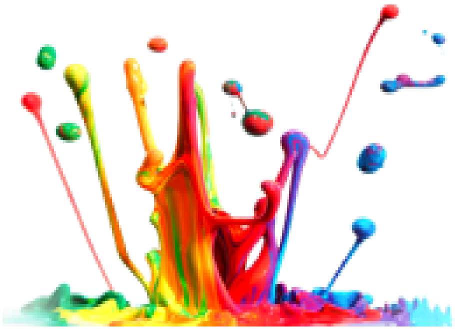
➔ **Biscuit:**
Input: Use a match to ignite – this might take some effort to start.
Output: Biscuit will burn slowly and produce less heat and light than a peanut.

Foods like peanuts and biscuits are high in energy and help us stay active.

Compare Fuels

FUEL	INPUT ENERGY NEEDED	OUTPUT ENERGY HEAT AND LIGHT
Wood	Moderate	Good heat and light
Coal	High	High heat, low light
Candle wax	Low	Steady light, low heat
Peanut	Moderate	High heat, low light
Biscuit	High	Low heat, low light

Time to make some notes:



BURNING FUELS

Fuels need two key requirements to burn:

1. **Heat**
   Fuels need heat to ignite – this can come from a match, lighter or another burning object.

2. **Oxygen**
   Air contains oxygen which is essential for combustion (burning). If there is no oxygen, the fuel cannot continue to burn.

SAFETY WITH FIRE

While can be useful it can also be dangerous.

Fires can spread quickly, cause damage to property and harm to people. Its important to understand fire safety and how to prevent fires.

Common Causes of Fire

COMMON CAUSES OF FIRE	DESCRIPTION
Unattended Cooking	Leaving cooking pots or pans on the stove, unattended, can cause fires.
Candles	Leaving candles unattended or placing them near flammable objects can start fires.
Electrical Faults	Faulty wiring or overloaded sockets can cause electrical fires.
Open Flames	Playing with matches or lighters can lead to an accident.

Fire Prevention Tips

- **Never leave cooking unattended:** Always stay in the kitchen when cooking.
- **Keep candles away from flammable objects:** Place them in safe holders away from curtains, paper or other flammable items.
- **Check electrical cords and sockets:** Make sure cords aren't frayed and do not overload sockets.
- **Educate about fire safety:** Teach children about the dangers of fire and playing with matches/lighters.

STEPS TO TAKE DURING A FIRE

- **STAY CALM:** Stay calm, do not panic
- **RAISE THE ALARM:** Shout "Fire!" to alert everyone in the house.
- **EXIT THE BUILDING:** Leave the building quickly and safely – don't use elevators
- **STAY LOW:** If there's smoke, stay low to the ground ad avoid inhaling it.
- **CALL FOR HELP:** Once outside, call the fire department or ask an adult to call.
- **DO NOT GO BACK INSIDE:** Never go back inside a burning building.

Time to make some notes:

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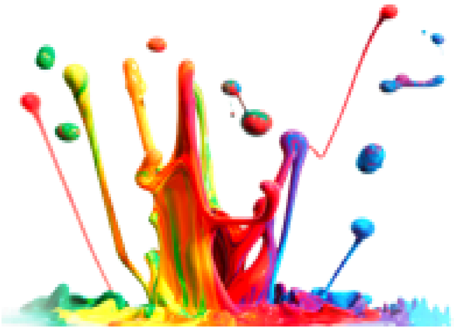


ENERGY AND ELECTRICITY

Cells and Batteries

Cells and batteries store energy that can be used to power various devices like torches, controls and toys.

Batteries come in all shapes and sizes.

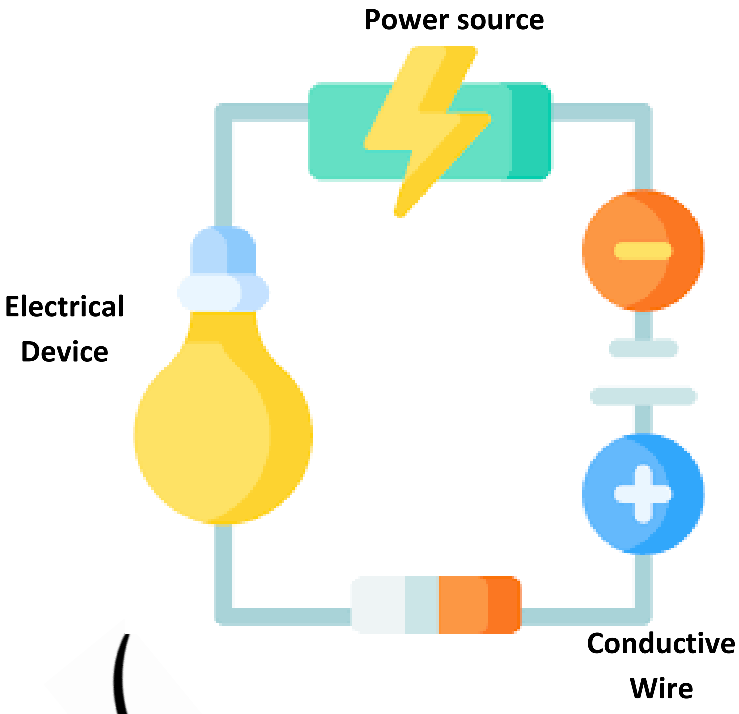
Cells

ENERGY STORAGE

The energy stored in cells and batteries can be released to power devices. This process involves the **flow of electrons, which generates electricity**.

Circuits Transferring Electricity

Circuit
A system that allows electrical energy to flow from a power source (battery) to where it's needed (light bulb).



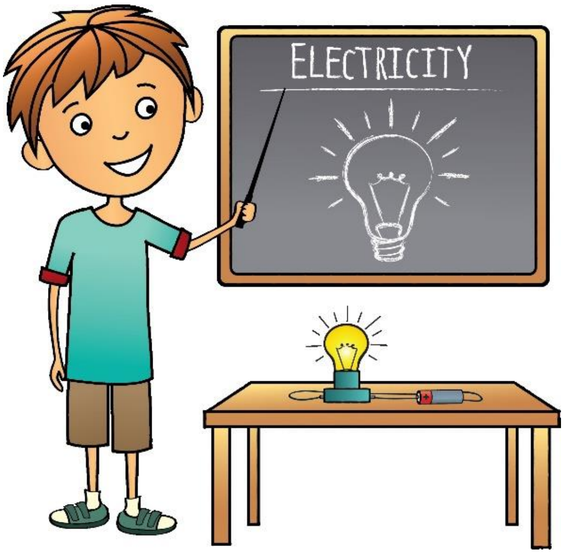
Components of a Circuit

A basic circuit includes:

- A power source (cell or battery)
- Conductive wires
- Electrical device (light bulb)

HOW DOES IT WORK?

When the circuit is complete, electrons will flow from **negative** end of the power source, through the wires, to the electrical device and power it. The electron will then return to the **positive** end of the power source completing the circuit.



Mains Electricity

This is the electricity that powers our homes and schools from a power station.

HOW MAINS ELECTRICITY WORKS?

➔ **Power Stations**

They generate electricity using various sources. In South Africa, many power stations use coal.

➔ **Transmission**

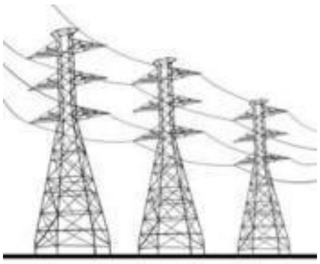
Electricity is transferred from power stations to homes and back using a network of circuits.
This network includes pylons, substations and transformers.

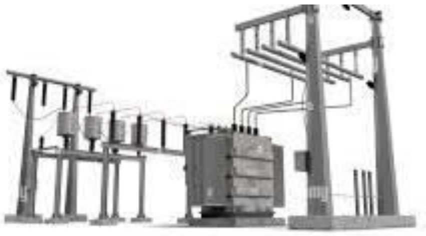
➔ **The Journey of Electricity**

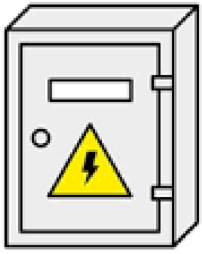
1. Electricity travels from the power station through high-voltage power lines supported by pylons.
2. Then it passes through substations where the voltage is lowered for safe use.
3. Finally reaches the wall socket and powers appliances.

Look at the images below:

Coal power station


Pylons


Substation


Electrical Box

Wall socket and plug

ENERGY SOURCES FOR POWER STATIONS?

Power stations need a source of energy to generate electricity.

- **Coal fired power stations:** Burn coal to produce steam which drives turbines connected to generators
- **Hydroelectric power stations:** Use the energy of flowing water to turn turbines.
- **Nuclear power stations**: Use the energy released from nuclear reactions (splitting atoms) to generate electricity.

Most popular in
Sout Africa

A very expensive way to generate electricity.

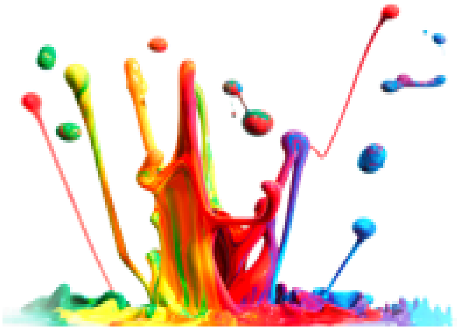
Safety With Electricity

Electricity is powerful and useful, but it can also be dangerous!

REMEMBER!!

- **Do not touch live wires,** always avoid contact with exposed wires
- **Keep water away from electrical devices,** water and electricity can cause shocks.
- **Use appliances properly,** always follow the instructions for using electrical appliances.
- **Do not overload sockets,** as plugging too many devices into one socket can cause overheating and fires.

Time to make some notes:



ENERGY AND MOVEMENT

Energy is the ability to do work or cause change.

Movement energy (also known as **kinetic energy**) is the energy of **motion.**

Elastics and Springs

Elastic materials and springs store energy when they are stretched, twisted or compressed.

This stored energy can be released to create movement.

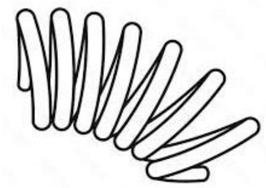
Think of releasing a stretched elastic band!

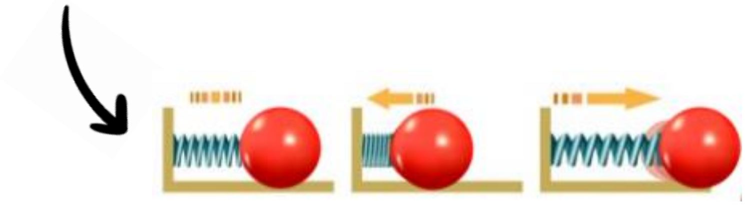
HOW DOES AN ELASTIC WORK?

When you stretch an elastic band, you are storing **potential energy** in it.
This potential energy is released as **kinetic energy** when the elastic is let go and causes it to move.

HOW DOES A SPRING WORK?

When you compress/stretch spring you store **potential energy** in it.
By releasing the spring, it allows the stored energy to convert into **kinetic energy** causing movement.





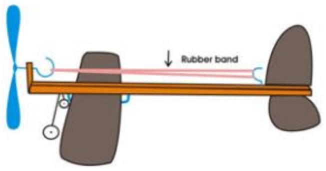
EXAMPLES OF ELASTIC AND SPRINGS IN ACTION

Catapult:

Used to launch objects at a distance and uses stretched elastic bands or spring to store energy.

How does it work?

Pulling back the arm of the catapult stretches the elastic band/compresses the spring. This stores potential energy and is converted into kinetic energy, as soon as it is released, propelling the object forward.



Elastic Powered Aeroplanes:

Use twisted elastic band to power their movement.

How does it work?

By twisting the elastic band, potential energy is stored. When the band is released, the potential energy is converted into kinetic energy, spinning the propeller and allowing the plane to fly.

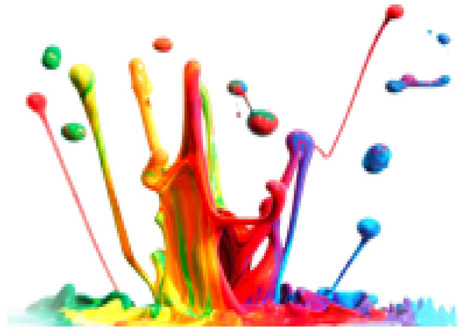
Jack in a Box:

A toy that uses a compressed string to surprise.

How does it work?

Toy's lid is closed compressing the spring (storing potential energy). When the lid is opened, the spring expands converting stored energy into kinetic energy causing the jack to pop out.

Time to make some notes:

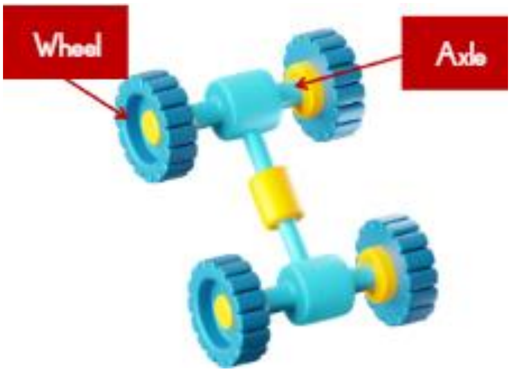


SYSTEMS FOR MOVING THINGS

Wheels and Axels

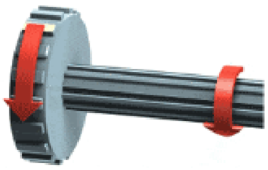
Wheel: A circular component that rotates around an axis.

Axle: A rod or spindle that passes through the center if a wheel allowing it to rotate.



HOW DO WHEELS AND AXLES WORK TOGTHER?

They **reduce friction** and make it easier for objects to move. When a wheel turns, the axle turns with it, allowing the vehicle to move smoothly. The move in the same direction.



Wheels and axels are used in many types of vehicles:

- **Prams:** Have small wheels attached to axles, making them easy to push.
- **Bicycles:** Have two wheels connected by axles allowing for smooth and fast movement.
- **Motorbikes:** Have two wheels connected by axles and are powered by an engine.
- **Cars:** Have four wheels connected by axles allowing them to carry passengers and goods.
- **Trucks:** Have multiple wheels and axels to support heavy loads.

Wheels and axels used in real life applications:

- **Shopping carts:** They help us to push our groceries.
- **Luggage bags:** These are easier to carry through airports on wheels.
- **Office chairs:** Wheels and axles allow for easy movement around a workspace.

Safety With Wheels and Axles

Always be safe when you are working with wheels and axles.

REMEMBER!!

- **Use tools carefully,** and always remember to be careful with scissors or cutting tools if you are making your own wheel and axle models.
- **Secure parts,** to avoid accidents.
- **Supervision is important,** and younger children should always have an adult nearby when working with tools and small parts.

Time to make some notes:

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Good Job!

NB:

Remember to go through all your content to prepare you for your test/exams.